North Dakota GIS Initiative Report
To Governor John Hoeven

July 1, 2004 – June 30, 2005

Executive Order 2001-06: "The committee shall issue a report to the Governor's office at the end of each fiscal year, detailing progress, and problems encountered with GIS development in the state."

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Executive Summary

The Geographic Information System (GIS) initiative in North Dakota during the period July 1, 2004 – June 30, 2005 was marked by a number of achievements:

- State agencies, local and tribal government, private enterprise, and the public continue to actively utilize the GIS Hub.
- Several new GIS Hub applications have been developed.
- New data sets have been added and existing ones updated.
- The contract for putting GIS into North Dakota K-12 schools has been completed.
- Coordinated GIS training continues.
- A pilot project to test the Geographic Coordinate Database continues.
- The GIS initiative received continued funding for the 2005-2007 biennium.

Starting in 2002 when the GIS Hub went into production the GIS Technical Committee (GISTC) has continued to focus on building upon the GIS Hub by adding data and applications. The GISTC is working to increase awareness of the Hub by promoting its use, value and functionality. These efforts continue to pay off as indicated by the usage of the GIS Hub. There is an average of 35 daily concurrent connections to the GIS Hub database from state agencies. The web applications average almost 50,000 hits per month. There have been over 27,000 data downloads since March 2004.

The GIS Hub, which is hosted within the State Information Technology Department's infrastructure, is the foundation of GIS work at the state agency level. Although the GIS Hub serves state agencies as a first priority, other levels of government and citizens also benefit from the GIS Hub. Agencies can utilize the GIS Hub infrastructure for applications to be used internally or provided to their constituents, saving them from having to build their own duplicated infrastructure. With the GIS Hub, data is now available through several standardized interfaces and in a seamless and common format. The GISTC is the key factor in promoting new and updated GIS Hub data which is key to existing, new, and planned GIS Hub applications.

During this report period, several GIS Hub applications were created or modified. The Department of Transportation upgraded the Road Construction application and added the internal QuickMap application. The Game and Fish Department now have both a public and a private application for accessing their data on-line. The Parks and Recreation Department has a program called Biotics (developed by NatureServe) which uses data stored on the GIS Hub. Several agencies, including the Health Department and the Department of Agriculture are working on or nearing the completion of other GIS Hub applications. More than one vendor has commented that the state is fortunate to have a system such as the GIS Hub in place for proposed and planned applications.

At the end of June 2005 approximately 1,350 gigabytes of data were stored on the GIS Hub compared to about 440 gigabytes in June of 2004. There are approximately 170 layers on the GIS Hub. New data that have been loaded onto the GIS Hub over the past year include: Bismarck-area trails, updated soils data, land classification, and the U.S. Department of Agriculture National Agriculture Imagery Program color aerial photos, Updated data sets

include the state-wide mosaic of U.S. Geological Survey aerial photos and watershed basin boundaries. The GIS Hub also contains agency-specific data that is used internally by those agencies.

A program for putting GIS into the curriculum of K-12 schools in North Dakota was begun with the signing of the contract in October 2004. North Dakota Career and Technical Education Department made arrangements with Environmental Systems Research Institute (ESRI) to provide free GIS software to all K-12 public and private schools in North Dakota, including ten North Dakota colleges. This program represents an excellent opportunity for expanding an exciting technology into schools across the state.

Since it's inception in 2002, the coordinated GIS training has saved the state nearly $52,000 in training costs alone. This amount does not include other people from private enterprise and federal agencies who have also participated in this training. The training is generally conducted in the Department of Transportation training lab, and the billing is now handled by the Information Technology Department.

A pilot project managed by the U.S. Bureau of Land Management continues with Golden Valley County and Billings County to determine the utility of the Geographic Coordinate Database (GCDB). The GCDB is a method for storing the Public Land Survey System (PLSS) data in such a manner that positional accuracies can be displayed. Data such as land parcels that are currently tied into existing PLSS data can be tied into the GCDB. Once in place, the GCDB can be used by utilities, surveyors, counties, and other interested parties. The GCDB provides a seamless, common interface to the PLSS data and data from that project will likely be housed on the GIS Hub.

The GIS Initiative received funding for the 2005-2007 Biennium to continue the development and growth of the GIS Hub. The GIS Technical Committee plans to continue adding data and applications to the GIS Hub, including increased outreach to federal, tribal, and local government.

Monthly Highlights

These are listed to show the timeline and details of happenings over the past year.

<u>July 2004</u>

- The DOT Road Construction web site is now in production. This application resides on the Hub and uses data from the DOT and from the Hub.
- Met with the ND National Guard. They are considering the creation of an enterprise GIS for their needs. I provided a brief presentation on the GIS Hub.
- Met with the Health Department Disease Control group. We discussed giving their contractor (STC) access to the ArcIMS test server and me providing assistance to the contractor.
- Met with the Health Department BioTerrorism group. I provided a presentation on the GIS Hub and possible uses of GIS with emergency response.

- State-wide road centerline project – I was notified on July 27 that this project has been cancelled. The Division of Emergency Management has stated that the cancellation is due to lack of funds. This is a missed opportunity for the state and its citizens to collect an important and high accuracy layer which would have been used by state agencies, counties, and others.
- Met with Information Technology Department (ITD) administration to discuss low-cost GIS storage. It appears that we will be able to get $1/GB/month storage for those data sets to be chosen by the GISTC.
- Completed the paperwork for receiving the grant from the U.S. Geological Survey. This grant money will be used to make GIS Hub data to the National Map (http://nationalmap.gov/)
- I received the go-ahead from ITD administration and the GIS Technical Committee to participate in the 2005 Bismarck-Mandan aerial photography project. The resulting high-accuracy data will be made available on the GIS Hub.

August 2004

- The order has been submitted to obtain 16 digital ortho quarter quadrangles of the 2003 National Agriculture Imagery Program (NAIP). Once we get these photos, we'll load them into ArcSDE to determine if we would gain in improved performance and image quality.
- Brad K. is scheduled to attend ArcSDE training September 27 – October 1. Brad will provide backup ArcSDE administration.
- Preparing for more coordinated training. Based on the initial response to my query, we currently have about 45 people who have expressed interest in training.
- First announcement for GIS Day has been sent out to the GIS listserv. We already have several good presentations lined up.
- We have received some of the "raw" National Agriculture Imagery Program" data. Waiting to get a test ArcSDE upgraded to load this data to test for quality of the data and storage requirements.
- Submitted information to ESRI for them to generate a quote for conducting an audit of the GIS Hub to be sure that we are following best practices.
- Request for development and printing of GIS Initiative brochures has been approved. The GISTC would use these brochures to educate the public, legislators, and other interested parties on the GIS Initiative.

September 2004

- All of the GIS Day presentation slots have been filled. We've had a good response from exhibitors as well. GIS Day will have a Lewis and Clark theme.
- Made a very brief presentation at the State Information Technology Advisory Committee (SITAC) meeting. The GISTC is requesting additional funding over the current GIS budget funding level. These additional funds will be used to purchase new and updated data.
- The existing Game and Fish (GNF) Hub Explorer web site was updated to include new functionality including data extraction. An additional Hub Explorer web site was created, which is secure and is to be used only by the GNF. The GNF department assisted in the

construction of these sites by doing much of the work themselves using the ArcIMS test server.

- I attended the National States Geographic Information Council (NSGIC) meeting in Austin Sept. 11-17. As usual an excellent conference. As a state we rank well in terms of the technology and approach that are used with the GIS Hub. We have a ways to go in terms of getting more involved with local and federal government. I'll have a report later.
- In anticipation of the upcoming elections, the Hub Explorer Legislative District web site has been upgrade to include improved printing.
- Had a conference call with ESRI to discuss the possibility of them auditing the GIS Hub to ensure proper configuration and best practices. From what I have sent them they tell me that it appears we are doing most everything correctly. They plan to complete their evaluation in a couple of weeks, and then create an action plan.

October 2004

- Made a presentation at the ND Association of Counties Annual Conference. I showed how to find data on the GIS Hub.
- The GIS Hub is now listed on the State and Local GIS channel of the Federal government's geodata.gov site. You can see this by visiting http://www.geodata.gov/gos and scrolling to the bottom of the page, clicking on 'State and Local GIS' in the box labeled, "Learn About Specific Application Areas."
- The black and white USGS aerial photos layer has been updated with the photos that the GISTC purchased, bringing the date range of the nearly 6,000 photos from 1990-1998 to 1995-1998, which is the most current for this data series.
- Met with the Bureau of Land Management and two consulting firms to discuss the status of Geographic Coordinate Database (GCDB) project in our state. Three counties are completed with a number of others being partially done.
- The contract between the Career and Technical Education Department and ESRI to allow GIS software to go into North Dakota schools has finally been signed.

November 2004

- The GIS Initiative brochures have been delivered and are in use.
- Attended the Minnesota Governor's Council on GIS in Fergus Falls, MN. Met some new people and got some new ideas on how we could potentially organize our state-wide GIS activities.
- Two full GIS training classes are now set up, one for December and one for January.
- Received the ESRI state-wide license to use GIS software in North Dakota schools, we are all set now to start distributing the software to those who ask for it. All questions should go to Ray H. at the Career and Technical Education Department.
- Met with the State Water Commission to discuss updating the state's aquifer maps. This is a project that the GISTC would like to do which benefits the SWC, the Health Department, and the Department of Agriculture.
- GIS Day was a success with 92 registered attendees. Approximately 34% are from state agencies, 23% from businesses (consultants and public companies), 14% from counties, 11% from federal agencies, 11% from cities, and 7% from higher education. Last year we had 122 registered attendees. I found out the week after GIS Day that there was a

Homeland Security meeting held at the same time as GIS Day, that might be where some of the county people were. Nonetheless, people enjoyed this year's event and I received some good comments. A vendor from Montana provided a very interesting Lewis and Clark with GIS presentation. He commented to me that he is very impressed with the state's GIS. He told me that if he was working here in ND he would be developing client applications using the Hub's web services (something the GISTC hopes that ND vendors will someday accomplish). I felt very good about his comment as Montana is very progressive in their GIS.

- The Full GIS Technical Committee (GISTC) meeting was held the day before GIS Day. We had 34 people from various levels of government, higher education, and private enterprise in attendance. The executive GISTC presented a progress report and got some feedback from the larger GIS committee.
- I provided a GIS Hub presentation to Minot State University. They are trying to start a GIS program at MSU and invited me to present what the state offers. There is a lot of interest.
- The statewide aquifer update contract between the state and the vendor has been signed. The Water Commission will manage the project and ITD will pay the vendor from the GIS Budget.

<u>December 2004</u>

- We had a coordinated GIS training class with 12 students, 9 of which were from state agencies. The state has saved over $43,000 in training costs alone since beginning this training in 2002. The savings are higher if we consider non-state agency attendees.
- Met with the ND Department of Agriculture to discuss moving the pesticide sensitivity (a model showing how easily pesticides are transmitted in water and soils) web site from the current NDSU location to the Hub. It is costing them a 5-digit number to host their web site and data at NDSU.
- Provided a letter of support to Brad R. of UND for his proposal to obtain a NASA-NSGIC (National States Geographic Information Council) grant. The grant will provide funds to host a remote sensing workshop.
- Met with Secretary of State Jaeger and other people from the Secretary of State office and the Association of Counties to discuss how to implement a web-based tool that will allow people to enter their address to find where to vote.
- At the most recent GISTC meeting, the committee approved using GIS budget funds to pay for the Sakakawea watershed basin delineation, to be overseen by the Health Department, and for National Hydrologic Dataset (surface water features) delineation, to be overseen by the Water Commission.
- Met with Parks and Recreation to discuss hosting of their planned Biotics system on the GIS Hub. Biotics is an application developed by the NatureServe group as part of the natural heritage program. Parks and Recreation will work with the Game and Fish in using Biotics to map biologic entities.
- Met with Dan F. of ESRI (Minneapolis office) to discuss his possible role in working with the Division of Emergency Management (DEM) to develop a GIS presence for Homeland Security at the DEM.
- Met with the Department of Agriculture do discuss hosting of the NDSU application that displays groundwater sensitivity to pesticides.

- Loaded Cass County metadata into the GIS Hub for display via the Hub's Metadata Explorer. This is really exciting, as this demonstrates how with very little effort and time the state can help local government with their GIS. When people search for data, information on Cass County data will be displayed along with contacts to the local government.

January 2005

- Met with the Bismarck-Mandan MPO to discuss the planned aerial photography project that is slated for later this year. The funding has come together and the RFP will be going out soon.
- Had a conference call with the U.S. Bureau of Land Management and their contractor, discussing the status of their Geographic Coordinate Database (GCDB) in North Dakota and how we can keep state agencies informed of the progress.
- The ESRI Web Map Services (WMS) connector is now running on the test cluster. This is the first step in making GIS Hub data available to the U.S. Geological Survey National Map.
- Met with the Department of Health and their consultant to discuss hosting of an application on the Hub. The application would display Health's facilities and corresponding information.
- Attended a meeting at Bismarck State College to discuss implementing GIS into their curriculum. This is part of the GIS in schools program headed by the Department of Career and Technical Education.
- Met with the State Historical Society, Historical Preservation, to discuss hosting data and an application on the Hub that would be used by their contractors to locate and print archeological and other information.
- Had a meeting with the Department of Agriculture, NDSU, and the USDA Natural Resources Conservation Service (NRCS) to discuss hosting the groundwater sensitivity to pesticides data and the application on the Hub. The application and data are currently hosted at NDSU.
- Attended a video conference call with Richland County/City of Wahpeton to discuss their plans to create a county/city GIS that includes the state GIS efforts.

February 2005

- Submitted a request to increase the Sun server memory from 4GB to 8GB in anticipation of an additional instance of ArcSDE and associated users.
- Submitted a request for a new ArcSDE instance for storing image data, including the 2003 color aerial photography. The size of this instance will initially be 1.5TB. This instance will be a good candidate for data storage on the $1/GB/month infrastructure that is not yet present.
- Met with Tim R. of the Historical Society. He provided me a tour of their Historic Preservation Division facilities and data in anticipation of him submitting a cost estimate request for developing and hosting a GIS Hub application.
- UND has been granted funds to host a NASA-NSGIC (National States Geographic Information Council - we are a member state) remote sensing workshop. I provided a letter of support to UND in December 2004. This workshop will probably be in Bismarck this Spring.

- Provided a presentation to the ND Rural Electric Cooperative annual meeting in Minot. The presentation included information on the GIS Hub and how people could get data from it.
- Met with Gary J. of UND to discuss my role in the upcoming NSGIC/NASA remote sensing workshop being put on by UND.
- Provided a presentation at the Division of Emergency Management to the Functional and Task Coordinators quarterly meeting. I described how GIS and the GIS Hub can play a role in emergency management.
- I am part of the Bismarck-Mandan MPO (Metropolitan Planning Organization) aerial photo selection team. We reviewed the RFP responses that have been received and selected the successful vendor (pending approval from the MPO). This data will reside on the Hub.
- Based on a request made by the USGS to a number of states, I submitted an application for a USGS liaison to be located in Bismarck. Our current liaison is based in Minnesota. Although our current liaison does a fantastic job for us, having a local presence might make us more aware of funding opportunities.

March 2005

- Met with ITD administration to review the Joint Funding Agreement between the state and the US Geological Survey (USGS). We'll be getting nearly $100K in matching funds to develop detailed surface water data.
- Based on the ArcIMS development workload, ITD will internally ask for expression of interest in doing ArcIMS-related work on an as-needed basis. Once the person is selected, he or she will go to ArcIMS training then come back and work on project work, both for ITD and agencies.
- A new ArcSDE database instance is now up and running, linked to 1.5TB of storage.
- GIS Hub data loading completed – 24 layers were updated and 5 new layers were added.
- Ten of the original Hub Explorer web sites were shut down to reduce the number of map services running and to reduce Hub Explorer maintenance. The data displayed by these ten sites are being displayed by a single Hub Explorer interactive mapping site.
- Met with the DOT and the Upper Great Plains Transportation Institute (NDSU) to discuss the Institute's pitch to the DOT to create a regional transportation database and web-based mapping system. It is my opinion there is no reason why regional transportation data/web mapping could not be hosted on the Hub. In addition, the National Map was brought up on a computer and it what shown that it already does much of what NDSU is pushing for.
- The WMS (web map service) is now running on production. This work was done as part of the grant that we received from the US Geological Survey. There are a few more tweaks to be made, then GIS Hub data will be available on the National Map.
- Took part in the videoconference with Richland County/Wahpeton to discuss their joint GIS project.
- Lara A. has been selected to help me with ArcIMS development as needed. And having another trained ArcIMS person will give ITD additional resources for future GIS applications.

April 2005

- Worked with the Health Dept. and their consultant, Windsor Solutions, assisting to set up a draft Hub Explorer application that displays monitored facilities. The data is created by the Windsor Solutions Facilities Profiler application.
- Lara A. will attend two ArcIMS training classes beginning in mid-April.
- Created a draft Hub Explorer web site for the Department of Ag's pesticide sensitivity project. This paid project will involve transitioning the data and multiple web sites from NDSU to the Hub.
- Met with the Bismarck-Mandan Metropolitan Planning Organization and the chosen vendor (Horizons, Inc.) to discuss the upcoming aerial photography project.
- Developed a cost estimate for the DOT for a new QuickPlot application that allows a user to quickly build a map at a set scale.
- Met with Bill G., Gen. Mike H., Brian B., Curt W., Doug F. (DOT), Doug F. (DEM) in the Governor's staff office at the request of Bill and Mike to discuss options of using remaining Homeland Security funds for road centerlines.
- Began working on a new DOT application called "Quick Map" (formerly called Quick Plot). This tool allows a user to quickly create a map at a set scale.
- The Bismarck-Mandan aerial photography was collected April 22. Delivery is expected by October.
- Attended a remote sensing workshop at the Heritage Center sponsored by UND, NASA, and NSGIC. I presented information on the state GIS Hub.
- Attended a videoconference with Richland County and the City of Wahpeton. They are in the process of implementing a Community GIS Technical Committee that they call CGISTC. The state is part of that effort.

May 2005

- Submitted information regarding the GIS Initiative to UND for inclusion in their grant application for their full membership into AmericaView, which they call NDView.
- Reviewed a proposed Bismarck State College GIS curriculum and provided comments..
- Met at the Division of Emergency Management with Paul S. from FEMA to discuss the current status of flooding in that area and data updates. There may be some minor updates to the Devils Lake web site.
- Met with the Tax Dept. to discuss data downloading of tax and address information as part of the national Streamlined Sales Tax project.
- Developed two new coordinated GIS training classes to be held in June.
- Met with the Dept. of Ag to review the NDSU groundwater pesticide sensitivity project. This data and a web application will be on the GIS Hub.
- The U.S. Geological Survey (USGS) Joint Funding Agreement (cost share) was signed. This will allow the USGS and the state GISTC, through ITD, to develop a digital layer of high accuracy surface water features.
- Completed the DOT "QuickMap" application which is used internally to create maps at a set scale for direct printing or importing into their CAD systems. The Hub Explorer web site is hosted on the GIS Hub, the interactive map is generated on their server.

- Completed a cost estimate for the Division of Emergency Management Rangeland Fire Index map. This will read the National Weather Service information and present that in map form.
- Participated in a video conference with Richland County, the City of Wahpeton, and surrounding areas (known as the Community GIS Technical Committee, or CGISTC). On behalf of the GISTC I will be signing a Memorandum of Understanding which indicates the interest of the state to work with their local governments in the context of exchanging spatial information and ideas.

June 2005

- Sent a letter of support for Minot State University, the Community GIS Technical Committee (CGISTC, composed of Richland County, Wahpeton, and surrounding MN counties), and for Standing Rock Tribe's applications for a Cooperative Program Agreement (CAP) grant from the U.S. Federal Geographic Data Committee. These grants are used for a variety of things, including development of GIS communities and metadata creating, training, and sharing. All of these have good potential to integrate with the state and the GIS Hub.
- Completed purchase requests for TeleAtlas municipal boundary and ZIP+4 data on the behalf of the Tax. Department which will be used in a future application that ITD will develop as part of the Tax Department's participation in the Streamlined Sales Tax initiative.
- Met with Tim R. of the State Historical Society to gather more requirements of a web-based Hub application.
- A new Sun server, a V-480 will be order to replace the current GIS Hub V-880. The new server will have a faster CPU and more memory. This new server should take us forward a few more years, after which the GIS Hub Oracle/ArcSDE may reside on an Intel or AMD server.
- The second June class of coordinated GIS training has been completed. 23 students were trained in these two classes which were held in the NDDOT training facility. A big thanks to the NDDOT for the use of their training room! ITD handled the payments from the students. If this had not been done these coordinated classes would be in jeopardy due to ESRI not wanting to do this work themselves. Since it's inception in 2002, the coordinated training has saved the state nearly $52,000 in training costs alone. This amount does not include other people from private enterprise and federal agencies.
- I attended the Open Source Geospatial conference in Minneapolis. The impression that I came away with is that with a few exceptions, OS GIS is not yet ready for an enterprise such as ours. For a smaller shop with the right kind of people skills, the situation is different. However, the server and desktop tools are rapidly becoming more mature and bear watching. Open Source GIS tools rely heavily on standards (data and file format), often being more compliant than commercial tools such as ESRI.
- Myself and three members of Technical Services visited the very impressive U.S. Geological Survey EROS (Earth Resources Observation and Science) Data Center in Sioux Falls to visit with them. We wanted to learn more about how they are managing huge data sets with their Oracle, ArcSDE, and ArcIMS. It appears that by and large we are doing the correct things though I think we all came away with some new ideas. I plan

to continue talking with them as they are interested in collaborating with us, mainly along the lines of data sharing.
- Met with the Department of Agriculture, the Department of Health, and NDSU to review the draft Dept. of Ag groundwater pesticide sensitivity web site. Lara will be completing this work.
- Participated in a conference call with the Community GIS Technical Committee (Richland County, City of Wahpeton, surrounding MN counties).
- Assisted the Department of Health contractor to move the Facility Profiler to production. The Hub Explorer web site needs to be completed but the basic, low-level stuff has been completed.

Future Goals

- GIS Outreach: Greater involvement with other levels of government, e.g., counties, cities, and tribal. Develop memorandums of understanding for data sharing and possible hosting of web sites. During this past year, data has been received from several counties and cities, but more can be done.
- Greater involvement with federal GIS initiatives, e.g., the National Map, Geospatial One-Stop. North Dakota is nearing completion of supplying GIS Hub data to the U.S. Geological Survey National Map. The National Map is a public tool that allows the user to view data across the country. When zooming in to North Dakota, much of the data shown will be drawn from the GIS Hub. Other organizations, including the private sector, will be able to make use of this new functionality. GIS Hub data is already available through the Geospatial One-Stop, a federal government geospatial initiative.
- Continue to develop and enhance the Hub with additional data, functionality, and applications. Some data should be developed with the State being an active financial contributor. Other states with successful GIS programs are doing this.
- Seamless, state-wide road centerlines are needed for emergency services and a large variety of uses at state agencies and local government. The GISTC will determine if this is a possibility with existing resources.
- Continue to market the Hub, making people aware of its flexibility and functionality.
- Improved GIS standards for data collection accuracy, naming conventions, etc. These standards will be developed in partnership with local government.
- Continuation of coordinated GIS training.
- Continue to make the Hub and GIS an integral part of daily State government business and service to the citizens of the state.

Challenges

- Data acquisition – the GISTC and the State Mapping Advisory Committee (SMAC) will continue working to identify data needs and prioritize them. The state should become more active being a partner in data development.

- Streamlined GIS activities in the state – a state-wide GIS strategy should be developed that encompasses state agencies, counties, cities, tribal, and higher education to maximize the benefits offered by the Hub. Bridges of communication must be established between the various centers of GIS activity within the state. This has begun to happen, but more needs to be done.
- Spatially accurate centerlines with consistent and accurate attributes for county and city roads throughout the state do not exist. This information is needed for day-to-day needs of agencies using GIS and is necessary if planned systems such as E-911 are to successfully exist. A state-wide centerline project organized by the Division of Emergency Management would have addressed this issue but the project was terminated shortly after the successful bidder had been notified of the intent to award the contract.